THE NATURE CONSERVANCY NEWS

November/December 1985

HERITAGE PROGRAMS: TAKING STOCK OF NATURE

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VOLUME 35, NUMBER 6
NOVEMBER/DECEMBER 1985

THE NATURE CONSERVANCY NEWS

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COVER: The small whorled pogonia (*Isotria medeoloides*)—an orchid so rare that only 17 populations were known to exist when it was federally listed as endangered in 1982. Since then, heritage biologists have located 20 new populations in New Hampshire and Maine. Photo by Fred C. Swope.

The Nature Conservancy is a national conservation organization committed to the preservation of natural diversity by protecting lands and waters supporting the best examples of all elements of our natural world.

To date the Conservancy and its members have been responsible for the preservation of 2,471,551 acres of forests, marshes, prairies, mountains, deserts, and islands: home to rare and endangered species of wildlife and plants. 3,859 projects have been completed since the acquisition of the first preserve in 1954. Approximately 60% of all preserves are retained by the Conservancy and managed by staff and volunteer land stewards.

A membership organization, the Conservancy was incorporated in 1951 in the District of Columbia for scientific and educational purposes. The Nature Conservancy is a nonprofit, tax-exempt corporation under Section 501(c)(3) of the Internal Revenue Code and is a publicly supported organization as defined in Sections 170(b)(1)(vi) and 509(a). All contributions are tax deductible.

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The Nature Conservancy

A copy of the last financial report filed with the Department of State may be obtained by writing to: New York State, Department of State, Office of Charities Registration, Albany, New York 12231, or The Nature Conservancy, 1800 North Kent Street, Arlington, Virginia 22209.

President's Letter

NOAH FILLED THE ARK without studying a map or consulting a computer print-out. He opened his doors and the creatures of the Earth filed through, two by two. The Nature Conservancy's job in the final decades of the twentieth century is more complex. To achieve our mission—preserving biological diversity through the protection of natural lands and waters—we need all the logistical help we can get.

Nothing is more fundamental to our work than precise scientific information. Our ability to negotiate for the land, and to manage it wisely once it is secured, means nothing without a sound system for identifying conservation goals: ascertaining which are the most jeopardized species and communities, and locating them on the landscape. We must know with considerable certainty what is truly endangered, where it occurs, and what its survival requirements are.

The same information is invaluable to many others, resource managers and developers among them, to guide planning before financial commitments are made. Access to ecological facts serves conservation and industry alike. With the whole picture before them, decision makers can weigh their options and avert expensive conflicts.

More than a decade ago, Conservancy scientists under the direction of Vice President Robert E. Jenkins fashioned the "natural heritage program" model to meet this need. The strategy was straightforward: in cooperation with state governments, the Conservancy would establish continuing inventories of plants, animals, and communities that are uncommon and threatened on a statewide or national basis.

This focus on the individual "elements" of a state's natural endowment (from manatees and showy lady's-slipper orchids to desert springs and great blue heron rookeries) was the greatest innovation of the heritage method. In previous ecological inventories, researchers had studied selected sites, collecting data on the species and communities found there. That approach overlooked many little-known natural areas with valuable and endangered features.

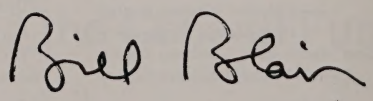
In addition, site-by-site inventories were conducted within a set time period and were soon outdated, whereas the heritage inventory was to be an ongoing process—continually updated and increasingly thorough. The theory was that only a dynamic program could accurately register the character of a changing landscape. In 1974, the first heritage program plugged in its computer and opened its doors—the South Carolina Heritage Trust, established in cooperation with the South Carolina Wildlife and Marine Resources Department. The idea had come to life.

The natural heritage concept has spread fast and far over the intervening 11 years. Today there are 38 Conservancy-designed state programs, two regional programs (for the Navajo Nation in the Southwest and the Tennessee Valley Authority Region in the Southeast) and four private programs, which proceed in the absence of formal government contracts. The map of the United States is almost entirely "green" with heritage inventories (see page 5).

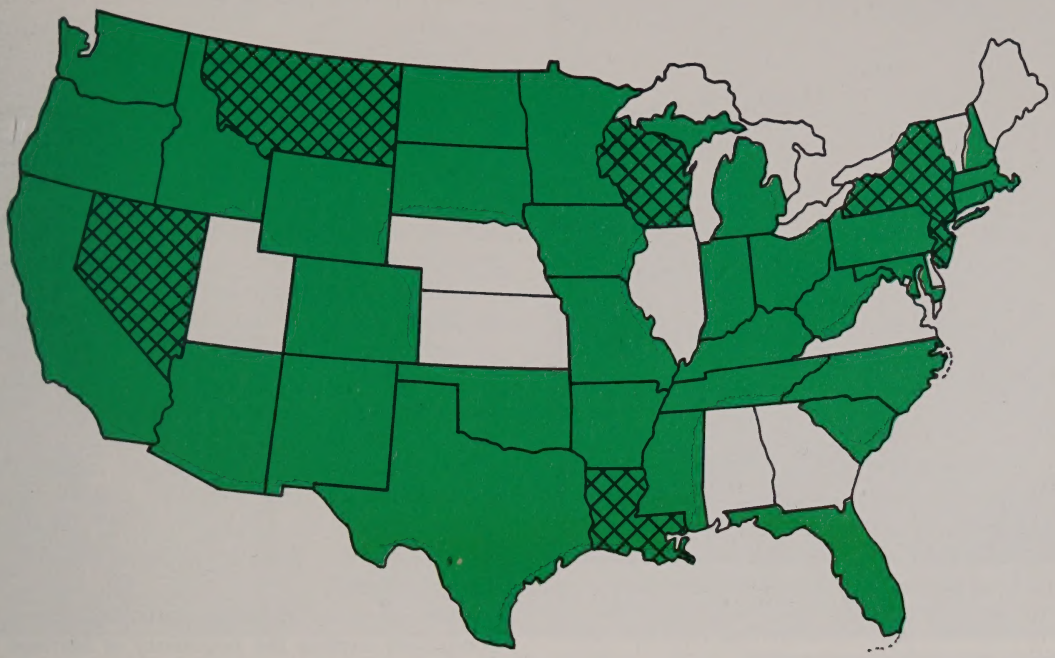
Perhaps the most exciting news to date is the assembling of a *national* ecological inventory. In recent years, the Conservancy has begun to integrate data from all regions into a single information base. The goal is to rank America's species and natural communities by the degree to which they are in danger of extinction. The benefit of such an overview to all Americans—field biologist and oil executive, farmer and schoolchild—will be immeasurable.

And heritage methodology is traveling beyond our borders. The Conservancy's International Program has been helping to create "conservation data centers" in Latin America. Patterned after state programs in the U.S., these inventories are under way in Costa Rica, the Netherlands Antilles, Peru, and Colombia (as well as Puerto Rico). Additional programs are starting up in Bolivia and Chile, while negotiations proceed in Paraguay and Mexico. The wider-ranging Latin American Conservation Data Center—a Conservancy effort partially supported by the Organization of American States, the U.S. Fish and Wildlife Service, and others—offers a *regional* overview of conservation priorities. (The center already has amassed the world's most exhaustive data base on terrestrial vertebrates of the neotropics.)

For our progress to date, we have many to thank. A host of excellent state agencies are our partners in this pursuit. Several major foundations, as well as many individuals and corporations, have funded our endeavors. Their help has been indispensable. With money yet to raise and programs yet to build, the job is far from finished—but our goals are attainable. Working quietly, methodically, and disinterestedly, the inventory programs have made a large and daily growing contribution to scientific knowledge in this country and abroad. In this issue of the *News,* we salute them.



William D. Blair, Jr.



Joan Pennington

The Heritage Concept: Entering the Second Decade

by G. Jon Roush

LATE LAST DECEMBER, I sat with some friends at the kitchen table in their Montana ranch house. It was the deepest part of winter, when every living thing holes up, hunkers down, and waits. I was using some of my spare time for visiting.

My friends run a ranch that I envy on the Blackfoot River. They are no-nonsense about ranching—not the kind of people you would expect to find picking wildflowers. But that's exactly what they had done a few months before, and now they were showing them to me. The dried plants, short and scruffy, did not look like much to boast about; but you would have thought they were family treasures.

During the summer, this inconspicuous plant grows in my friends' barnyard—surviving mud, sun, hooves, and weed-to-weed combat with its neighbors. The location seemed right. A low-class plant like this would be out of place in a more dignified habitat. Even its name is homely: Howell's gumweed.

Yet it is anything but common. Although Howell's gumweed seems to thrive in the commotion of my friends' barnyard, it has been found in only four other places in the world. All but one of its populations live in a single Montana county; the other is in Idaho. A few casual applications of herbicides, some mowing or grazing, and Howell's gumweed goes the way of the passenger pigeon.

What could help this plant survive? Our conversation turned to a biological inventory system designed to help protect such stragglers along the evolutionary path. This system, the natural heritage program, locates a state's rarest plants, animals, and communities of species. It then determines which are in most danger. Usually a state agency—like a

Bob Kiesling

Howell's gumweed, once used by Indians to treat poison ivy and other ailments, grows at few sites in the world. Thanks to the Montana Natural Heritage Program, three populations are in safe-keeping today.

fish and game department or a department of natural resources—administers the heritage program, which it sets up with the assistance of The Nature Conservancy.

Conservancy scientists, working with the State of South Carolina, devised the first heritage program eleven years ago. They have refined the system continually since then. With a small professional staff (typically three or four people), each heritage program finds and generates information about the status and whereabouts of rare species. Currently, 38 states, Puerto Rico, the Tennessee Valley Authority, and the Navajo Nation operate heritage programs. New programs have been adopted by states at the rate of about four per year.

Such widespread approval of a single data system is rare. Stranger still is the diversity of its supporters. Heritage programs have been applauded by labor unions and chambers of commerce, trade associations and environmentalists. Why are so many groups who are often at odds now in agreement about the heritage programs?

We could hope that they understand how urgent the need is. We are losing species at a rate that is probably unprecedented in the three-billion-year history of life on Earth. Every rancher knows the first rule of practical stewardship: throw nothing away. You never know when a piece of wire or a can of washers might be useful. Yet although the wire in my shed accumulates steadily, the decline in the number of species is accelerating. Incredibly, in the 15 years remaining in this century, the world's present store of species will decrease by 10 to 20 percent.

In most cases, we will not even know the value of what we are losing. With Howell's gumweed, however, we have some clues. Indians used another, more common species of gumweed as a source of tea and medicines: a cure for poison ivy, a sedative, an antispasmodic, and an expectorant. Since almost half our medical prescriptions contain drugs derived from plants, we might want to study this one.

Even if Howell's gumweed doesn't cure cancer, we should still be cautious about letting it disappear. In general, natural systems are too complex for our understanding. Nonetheless, we do know that species rely on each other in an intricate network of relationships. If you cut one string in a net, you probably have not greatly damaged the net. But if you cut another string every day, you will begin to see some serious holes. Keep it up, and you will have to buy a new net. The trouble is, we can't buy new natural systems.

Although these arguments are strong, they do not completely explain the popularity of heritage programs. Money has something to do with it too. Consider the alternatives. Every year in the United States, tens of millions of unproductive dollars are spent on project delays and litigation. Often the conflicts involve rare species or natural communities. According to one estimate, every time a species is *not* listed as endangered or threatened under the Endangered Species Act, the U.S. Fish and Wildlife Service immediately saves $50,000. And that's just the beginning. Who could calculate the cumulative cost of preparing and reviewing environmental impact statements?

Yet after wading through a few pounds of impact statements, what do the bleary-eyed reviewer, citizen, and judge really know about a proposed project? *If* the information is reliable and complete, they know what the possible impact might be on a particular site. What they don't know, however, is how to weigh that impact in some larger context. Where should society put its money: fisheries, elk habitat, or neither? Which is more important: jobs or grizzlies? Can't agree? Then hire another lobbyist, call a lawyer, raise more money, and step outside and say that.

If you think there should be a better way, you're in good company. Theoretically, the alternative is easy. Noah used it first. If you can't save the whole world, at least save a representative array of its genetic resources. Then you will have something to build on when you need it. Such a strategy obviously gives highest priority to preserving those species most in danger of extinction, and usually the only way to save a species is to protect its habitat.

Sue Crispin

A horde of stunted trees on Lookout Mountain, the last "northern bald" community in Michigan. Identified and endorsed for protection by heritage staff, the site is now a "registered" natural area.

Robert Clark

White ibises on the nest, South Carolina. The heritage program there—oldest of the 38 state inventories—keeps track of wading bird rookeries for the South Carolina Department of Wildlife.

Unfortunately, 20th-century scientists have had trouble matching Noah's efficiency. As early as the 1920s, ecologists recognized the need for a catalogue of natural areas deserving preservation. A 1926 inventory of natural areas by the Ecological Society of America (The Nature Conservancy's forebear) was the first. By the 1970s, almost every federal land management agency had tried its hand at natural areas inventories, as had many private groups and state agencies.

All these inventories fell short for one reason or another. Most tried to compare one area with another. But with few objective criteria, one expert could disagree with another and usually did. As a result, conservation policies have been short on science and long on politics.

These political shortcomings were compounded by the tunnel vision of some of the catalogers. Surveys of wild and scenic rivers ignored rare plants. Surveys conducted by single agencies often did not use data gathered by others. One-time surveys were often obsolete before they left the printer.

Eleven years ago, the natural heritage concept did to earlier inventories what Einstein did to Newton. Instead of inventorying and classifying *places,* heritage programs inventory and classify *elements of diversity*—individual species or communities of species. Elements usually occur on more than one site.

The heritage program data base is organized around these elements so that dissimilar things (such

Marc desMeules

as orchids, prairies, and warblers) can be compared in terms of their overall range, pattern of distribution, rarity, degree of current protection, and other measurements. With these comparisons, scientists can determine which elements are most imperiled, what is known about their habitat needs, and which ones need more research.

Each heritage program begins with secondary sources and picks up material buried in museum basements and researchers' unpublished field notes, leaving no tome unturned. The heritage staff scientists, with help from other agencies and interested researchers, head for the field to check the preliminary data.

Because of this approach, early stages of each heritage program usually turn up some major surprises. Virtually all have found species not previously recorded in their states. The Arkansas Natural Heritage Inventory has found 12. Even more frequent are rediscoveries of species presumed extinct

Jimmy Kagan

Marc Evans

Heritage researchers around the country have sleuthed out numerous "new" occurrences of species apparently extirpated in their states. Among them (clockwise from top) are: the northern chorus frog in Vermont, Thelypodium howellii *ssp* spectabilis *in Oregon, and* Gentiana alba *in Kentucky.*

Larry Master

Gary Meszaros

Tom Breden

Round-up of rarities ("elements" in heritage parlance). Clockwise from top left: the northern bog lemming, recently rediscovered in Maine, where it was last seen in the early 1900s; a new, undescribed buck moth species found this year by the New Jersey Heritage Program; the piping plover, a sparrow-sized shorebird for which the North Dakota Heritage Program is helping the Conservancy design a projected preserve.

in a state. Massachusetts may have the record. Its heritage program sponsors the "Century Club" for species rediscovered in the state after at least a 50-year gap. The club has 23 members. Occasionally heritage programs even find a species completely new to science. The Wyoming and Colorado programs have found a total of 12.

But heritage programs do not simply multiply the number of rare species. The happiest ending is when a species is found to be more numerous and in less trouble than people thought. This often happens. In New England, Michigan, Tennessee, Colorado, and Wyoming, heritage programs have contributed to significant reductions in state endangered/threatened species lists.

Is all this searching, cataloging, and mapping useful? Just ask the government agencies that use heritage data for the environmental review of proposed projects. The Tennessee program alone conducts 1,200 environmental reviews each year. With financial assistance from the U.S. Fish and Wildlife Service, a number of state governments have given several state heritage programs "rare plant authority" to review candidates for official listing as endangered or threatened species. At the federal level, the National Park Service, the U.S. Forest Service, and the Bureau of Land Management have all contracted with heritage programs for inventory expertise and planning help.

Since heritage information can be used to stop development projects, you might expect business people to pray for a little sloppiness. But for business success, the secret word is "certainty." Whether you are a titan of industry or a local road contractor, you can live with regulations as long as you are warned in advance. Then you can plan accordingly. But you hate surprises that delay your project—such as regulatory change orders, injunctions, and appeals.

Every state heritage program has stories of potentially expensive conflicts that were avoided because

A WORKING SCIENTIST'S VIEW

by Daniel Simberloff

To compile complete ecological information is a forbidding task for the natural scientist, even in the data-focused United States. At least it was until The Nature Conservancy's "heritage" ideal grew into a network of state inventories and threw the doors open on a wealth of facts hitherto scattered and inaccessible.

Many a biologist has spent years accumulating basic information on species and communities to advance his or her research. A case in point involves the study a colleague and I have been doing on an ecological law known as the "peninsula effect." Cited in numerous textbooks, but poorly understood, the law states that species diversity decreases from the *base* of a peninsula to its *tip*. But this holds true only for some groups of species and some peninsulas; and even where it holds, we're not sure why. Is there something about peninsular shape that leads to a decline in number of species? Or is the "law" simply a generalization from a few peninsulas in which habitats change from base to tip?

These questions are of more than academic interest. If species diversity would suffer in a long, thin nature preserve, should the shape of a site argue against its preservation—even though it bears ideal habitat for an endangered species or community? To judge the significance of the peninsula effect, ecologists must know which species are where. Such data are scarce. Even scarcer is habitat information that might tell why some peninsulas exhibit a gradient in natural diversity.

In recent years, a colleague and I were studying the peninsula effect for Florida reptiles and amphibians, which decline from 106 species at the Georgia border to 60 in the Everglades and Keys. Just to know which species are in which counties, we examined records from 20 museums, read hundreds of journals, and consulted the records of dozens of herpetologists. To see whether the decline might be caused by habitat change from north to south, we consulted atlases, vegetation maps, and many accounts of plant geography. We finally concluded that the explanation for the peninsula effect as it concerns Florida reptiles and amphibians indeed rests on habitat differences.

To discover whether Florida is the rule or the exception, we would have to look at other groups (mammals, birds, invertebrates, fishes, plants) and other peninsulas (Cape Cod, the Alaska Peninsula). It took three years to do our work on Florida reptiles and amphibians. If we are to proceed with our research, we need help:

Fortunately, the state natural heritage program in Florida has come to our rescue. Established as a cooperative venture of the Conservancy and the Florida Department of Natural Resources in 1981—

of the accuracy and timeliness of heritage data. When the Mississippi Highway Department proposed a highway that would threaten a globally significant bog, the heritage staff simply persuaded the department to narrow the median strip for a short stretch, and the bog was saved. Influenced by information from the Florida Natural Areas Inventory, the Seminole Electric Cooperative chose another site for a projected power plant. The original site went on to stardom in *The Garden of Eden,* a Conservancy-produced film nominated for a 1984 Academy Award.

State heritage programs generate good stories every day; but the story behind the scenes is interesting too. To complement the inventories, The Nature Conservancy has deployed a large and versatile staff of its own. Conservancy scientists help plan heritage programs and train staff. They provide technical support in botany, zoology, ecology, and data management.

They also test new ideas, passing on the good ones to state programs. In 1980, the Maryland Natural Heritage Program (now the Maryland Natural Heritage and Environmental Review) became a "model program"—a laboratory for hands-on experiments by Conservancy heritage staff at the national office. Several innovations have come from that effort. One of the most important was the development of a handy technique for a grim task: an element ranking system that measures the degree of peril facing elements listed by the heritage programs. Now all the programs rank elements and update those rankings regularly.

Element ranks are useful for the heritage programs' central purpose: to set priorities for conservation. Conservancy scientists are working on other tools as well. A couple of years ago, they developed "natural diversity scorecards," which help Conservancy field offices determine priorities for action in each state. And now specialists in preserve selection and design are going a step further. Looking at biological, legal, political, and financial information,

too late to be a help when we undertook our original research—the Florida Natural Areas Inventory is filling us in on the distribution of Florida mammals. And if all goes according to plan, the *national* data base that the Conservancy is erecting will soon make our task immensely easier, enabling us to show patterns of species diversity with the touch of a computer key. At last, it appears that the comprehensive biological survey American ecologists have dreamed of for decades is at hand.

The value of a national heritage inventory is incalculable. It will allow us not only to answer many of the questions we've asked, but also to formulate questions we haven't yet begun to consider. Without ready access to systematized information on which species and communities are where, we can't identify broad ecological phenomena, much less begin research on their causes.

In the past, the major stumbling block to our work was the fact that most information had been gathered by individual researchers who were unaware of one another's data. The Conservancy has changed all of that. With a fleet of state programs and a fast-growing national inventory, the heritage network has become the logical place for the natural scientist to begin a search.

Daniel Simberloff is professor of biological science at Florida State University. His fields of expertise are ecology and biogeography.

they determine the best sites and boundaries for future preserves.

To bring these and other services to the state programs, the Conservancy has set up two regional centers: the Eastern Regional Heritage Task Force in Boston and the Rocky Mountain Heritage Task Force, which recently opened in Denver. Others will follow.

All this costs money, and the heritage programs have had many supporters. For generosity and foresight, the honors go to the A.W. Mellon Foundation, which has fueled the programs' growth with a series of crucial grants totaling $2.6 million. In 1974, an A.W. Mellon grant allowed the development of the earliest programs. Follow-up grants in 1977 and 1980 helped introduce the programs in more states, improve inventory theory and techniques, and develop element ranking. The foundation also stepped in again in 1981, when federal and state budget cutbacks threatened several heritage programs. This time a matching grant saved most of them.

Finally, in 1983, a $1-million A.W. Mellon grant initiated what may be the most important step in the development of heritage progams. The goals are heroically simple: the establishment of heritage programs or their equivalent covering *every* acre in the United States (supported by additional regional heritage centers), and the subsequent creation of computer capabilities for a national biological data base unequaled in the world. This grant has been augmented by other millions of dollars from the William and Flora Hewlett Foundation, the John D. and Catherine T. MacArthur Foundation, and the J. N. Pew, Jr., Charitable Trust to help complete a national data system. The national inventory will enrich research, help set nationwide conservation priorities, and speed the exchange of information among state programs. Working with state and regional programs, it will provide the bedrock data needed to find and save America's rarest treasures.

Heritage methodology is relentlessly pragmatic. Its innovations emerge in response to the practical needs of professional conservationists. But the data is reaching other people too, many of whom aren't sure of the difference between flora and fauna. Every element is, after all, a real plant, animal, or community that lives *somewhere*—on land owned or controlled by some real person. Time and again, the news that something is rare and in danger has moved landowners and agencies to protect it voluntarily. They have adjusted their plans and behavior to leave room for small bits of creation that would have been trampled or bulldozed, unnoticed, a few years ago. And in the process of saving a sedge, bat, or salamander, some people are also adjusting their ideas about the American landscape and how to treat it.

As I learned on that wintry day in Montana, such voluntary action can make all the difference. We are all lucky that my friends are watching out for the gumweed on their ranch. Only luck and the good will of a few landowners have spared this species. None of the known populations has any formal protection.

Heritage programs are entering their second decade. In the normal tempo of evolution, a decade is the blink of an eye. But for some species, each year of continued existence is a triumph against long odds. The heritage idea has already strengthened the odds for many. For the rest, it is a beginning full of hope.

With permission from the editors, this article was adapted from "The Natural Heritage Program: Looking for Treasure," which appeared in *Northern Lights Issues*—a publication of the Northern Lights Research and Education Institute. **G. Jon Roush** is chairman of the Conservancy's Board of Governors.

From the Field: An Interview with Mark Sheehan

conducted by Fayette Krause

Mark Sheehan is director of the Washington Natural Heritage Program, to date one of the most successful Conservancy-established state heritage programs. Fayette Krause is the land steward for the Conservancy's Washington Field Office.

Q. How was the Washington Natural Heritage Program created?
A. Our heritage program is a fine example of The Nature Conservancy's firm belief in forming partnerships to achieve shared conservation objectives. It was established cooperatively in late 1977 by the Conservancy, the state's Department of Natural Resources (DNR), the Washington Department of Game (WDG), and three other agencies: the Parks and Recreation Commission, the Department of Ecology, and the Interagency Committee for Outdoor Recreation. Initially, the heritage program was responsible for gathering data on rare animals, plants, and plant communities. At the end of its second year, it turned over the data base on animals to the Department of Game's Nongame Program, which continues to maintain that inventory system. The Conservancy staffed the heritage program, and both the DNR and the WDG provided office space, computer support, and other types of assistance in the first years.

Q. Tell me about the program's early history. What did you have to do first?
A. First, we had to create a data base containing information on jeopardized species and natural communities. For example, botanists had an intuitive feeling about which plants were rare and what communities were threatened, but they had no centralized record of where they occurred. If you don't know the current distribution and relative rarity of a plant or community, you can't objectively recommend the protection of one species or community over another.

So, we developed a preliminary list of rare plants and plant communities. By combing the literature and talking with amateur and professional botanists and ecologists, we were able to identify a number of sites where these species and communities occurred historically. Then we went into the field to verify the existence of these areas, and with this information, we began building our data base.

Q. What did those field investigations show?
A. First, many plants thought to be rare turned out to be relatively common. In fact, because of our work, 121 species are no longer classified as endangered, threatened, or sensitive—they've been demoted to what we call a "monitor" status. Of course, other species have been listed; but the demotions outnumber the additions. For plant communities, we found that many historic sites had been converted to wheat fields or subdivisions or were degraded in some way. Nonetheless, some remained intact, and they provided benchmarks against which we could compare other examples of the same community types. With all this information in our computer, we were up and running. And we've been adding data and fine tuning ever since.

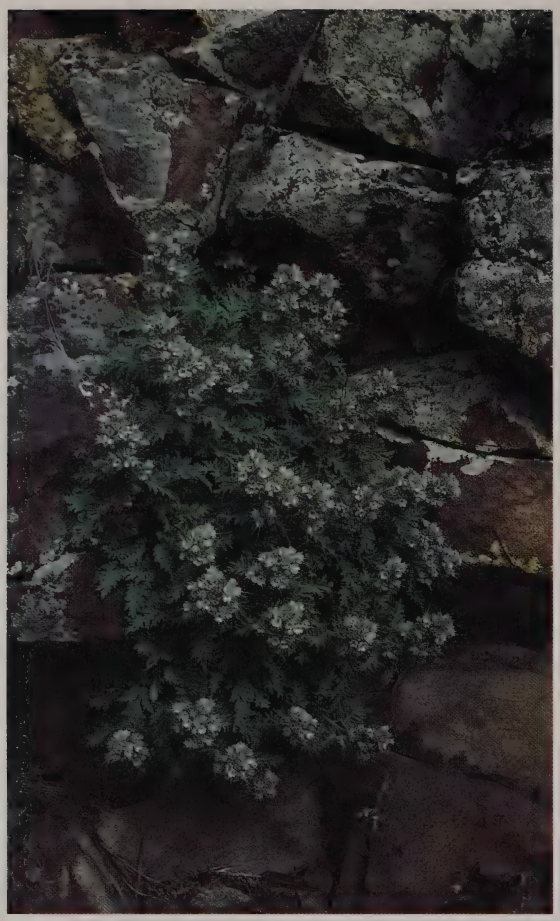
Q. With your data base functional, what happened next?
A. We began making choices. In 1980, three years after the heritage program was established, we packaged our first batch of preserve recommendations. Today, more than a dozen of these sites are managed by the Conservancy or the Department of Natural Resources. All our initial protection recommendations were for plant communities. In fact, we didn't suggest a site solely to save a plant species until 1985. At any rate, setting acquisition priorities was and is a regular part of our work. And as specific plant communities or species are safeguarded, other systems and species rise to the top of our list.

Q. By concentrating on protecting plant communities, have you neglected rare plants?
A. No. There are 12 preserves, established over the past eight years, that harbor one or more rare plant species—23 occurrences in all. Of the protected plants, two are endangered in the state and three are threatened. The rest of them are classified as "sensitive." There are also two rare animals on these preserves.

Laura Smith

At left, interviewee Sheehan among golden Indian-paintbrushes—a globally endangered species shown at close range below. Alerted to the plant's rarity by the Washington Natural Heritage Program, two federal agencies and a private corporation abandoned plans that would have damaged its habitat.

David Mladenoff



Ed Alverson

C. Maxwell

Reid Schuller

A triad of heritage program discoveries: sticky phacelia (at left), a species that had been considered extinct for a century: queen-of-the-forest (top right) and Thompson's sandwort (bottom right), two plants new to Washington.

Q. In addition to identifying sites for acquisition, the data base ideally guides development away from ecologically critical areas. How has this worked?
A. Very well. For instance, the now defunct Northern Tier Pipeline Company was planning a route right through the best remaining Puget Trough grassland. When we told the project coordinator about the conflict, he adjusted the company's proposal so the planned route skirted the site.

We also have some examples of state and federal agencies modifying or abandoning projects to accommodate rare plant populations. The National Park Service planned to put a roadside lookout point in the middle of one of the nine remaining sites in the world for the golden Indian-paintbrush. When it found out about the plant through the heritage program, the plan was altered. The Forest Service decided to retain a particular piece of property slated for inclusion in a land exchange when the forest supervisor learned that it hosts a large population of Wenatchee larkspur—a candidate species for federal listing. And, the state's Parks and Recreation Commission eliminated plans for a new trail through an old-growth forest in a state park after our botanist discovered a rare plant there. The commission later increased protection for the plant—and the trees—by designating the site as a natural forest.

Q. In all these examples, you initiated the contact. But how frequently do others actually ask you for data, and who are the primary users of heritage program information?
A. In 1984, we received 125 requests—approximately half came from other state and federal agencies, one-third from consultants, and the rest from conservation organizations and the general public. When you add the 20 to 30 inquiries we got per month from DNR staff, we processed more than 400 separate requests for information. This year we've received about 150 outside queries to date.

Q. I understand that the Washington Natural Heritage Program differs from others. How?
A. You might say that we're a "full service" heritage program. We perform all the standard functions related to gathering and disseminating information.

Working with the Conservancy, we've also instituted the Washington Register of Natural Areas. For this program, we recommend sites harboring critical species or natural communities that might best be preserved by the landowner—private or public—through a voluntary protection agreement. These are usually smaller parcels of land that may not justify purchase, but they're still worth saving. Finally, unlike most other heritage programs, we're actually land managers. We have direct responsibility for the state's Natural Area Preserve System, which contains 17 preserves owned by the Department of Natural Resources. These sanctuaries range in size from 10 to 445 acres.

Q. The registry program sounds innovative and cost-effective. Would you tell me more about it?
A. Registry programs have been very successful in the East, where lands often have been held by the same family for generations. Many property owners are already attached to their holdings and think they're special, even if they aren't aware of the lands' biological values. Consequently, they're usually more than willing to enter into voluntary protection agreements with the Conservancy. But frankly, we didn't know if registry would work in the West, where generational ties to the land have had less time to develop. Also, there's that old Western folklore about landowners not liking "outsiders" meddling with their property.

Although the Washington registry program is sanctioned by state law—and participants receive a certificate of appreciation signed by the governor and the commissioner of public lands—landowners actually are contacted by a Conservancy staff person. The voluntary nature of the protection agreements is underscored, and the involvement of a private group like the Conservancy helps defuse any animosity owners might feel towards a purely governmental program. As a result, registry has been very successful here.

Q. How is a site really protected if a landowner registers it?
A. Well, landowners who take part in the registry program usually have a heightened interest in their properties—they'll watch over them. For instance, one participant noticed that activity at a nearby gravel pit had encroached on his land and partially destroyed habitat for a plant threatened in the state (Arthur's milkvetch). He stopped the trespassing and declined to sell his property when the the gravel pit operator offered to buy it.

Q. Are those agencies that participated in the establishment of the Washington Natural Heritage Program still actively involved in it?

A. I think that support for the program is increasing. In 1984, the Parks and Recreation Commission became the first agency outside the DNR to dedicate land under its jurisdiction as a state natural area preserve. The Washington Department of Game followed suit by designating one of its holdings as a natural area preserve and is considering dedicating several more. These agencies continue to manage their own lands, but management plans are developed in cooperation with the heritage program staff.

Also, the Washington Department of Ecology recently contracted with the heritage program to conduct a Puget Sound wetland study. Our research covered saltwater systems and identified 19 sites as relatively undisturbed examples of various wetland types. Some of these areas have since been recommended for acquisition. Finally, I'd be remiss if I didn't mention the DNR. Of the department's 17 dedicated natural area preserves—which are cared for by the heritage program—13 have been established since 1981. That's a tremendous achievement for an agency that previously had been known

Mark Sheehan

Controlled burning at Washington's Mima Mounds Natural Area Preserve—prescribed by heritage scientists to promote the vigor of prairie flora. The unusual Washington program is responsible for stewardship of the state's sanctuary system.

Mark Sheehan

almost exclusively as the state's commercial forestry division.

Q. How about legislative support?
A. We've received excellent bipartisan backing. For example, 1981 was an extremely lean year for state government in Washington. In that year's legislative session, the legislators approved funding for only *one* new program: it earmarked money permitting the transfer of the heritage program staff from the Conservancy's payroll to the state's payroll within the DNR. Then, in 1984, the legislature enacted two other "firsts" for the heritage program. It voted overwhelmingly to provide the first operating funds for preserve management, and it also approved $1 million to purchase additional sites for the DNR's Natural Area Preserve System.

Q. All the heritage programs are becoming well known for their discoveries. How about the Washington program?
A. We've had our share. Thompson's sandwort, previously known only from Oregon and thought to be extinct, surfaced at two sites in Washington. Shortly after we discovered the first site in 1984, a graduate student located a second population. A better example of this "snowball effect" is sticky phacelia, a plant that had evaded botanists for a *century* before one of our contract employees happened upon it. Following his find, we located a dozen or so other sites. That's quite a rapid change—from extinct to a downgraded ranking of threatened in the state within a three-year period.

In all, heritage staff members have documented more than a dozen new plant species in Washington—plants never before known to occur here. Moreover, another six plants, believed extinct in the state, are again recognized as part of the state's flora, thanks to our work.

Q. Throughout its eight-year history, the heritage program has employed many people—more than 30 permanent and part-time field botanists. What was the most extraordinary experience one of these people had while in the field?
A. In 1980, John Scott, one of our contract employees, was working approximately 45 miles east of Mt. St. Helens when it first erupted. For some reason,

Mark Sheehan

Ironically, heritage scientists routinely prove species presumed rare to be quite common. In Washington 121 plants have been "demoted"—including lanceleaved stonecrop (top left) and Olympic Mountain paintbrush (above). Rectifying such errors saves conservation agencies time and money.

Mark Sheehan

Skookum Inlet salt marsh, one of 19 significant Puget Trough wetlands identified by heritage researchers under contract to the Washington Department of Ecology.

the blast was inaudible where he stood. When he noticed the billowing dark clouds coming from the mountain, he thought at first that they were thunderheads. But as the clouds came nearer, he realized his mistake. The ash engulfed him, and he groped—and I imagine gasped—his way to his car. It took him several hours to get to Tampico, a trip that normally takes less than an hour. From there he drove to Yakima in central Washington. He didn't stop, which was fortunate, because he was one of the last people to leave town before officials closed all roads in the vicinity. That ended field work near Mt. St. Helens and parts of eastern Washington for the year.

Q. Has the heritage program matured and, if so, does this imply that it's static? Is there still opportunity for innovation and growth?

A. The program has certainly changed. We no longer rely heavily on secondary sources for leads. As a matter of fact, most of our information now comes from field work. Given our current methods for locating community types, I suppose you could say we're approaching a level at which numerous or impressive breakthroughs will be fewer. However, we do have other identification techniques that we have not yet systematically used, such as remote sensing and air-photo interpretation. They could produce excellent leads, especially in more inaccessible parts of the state.

Although it may seem that we're approaching a stable state—becoming a victim of our successes—I am more impressed with what remains to be done. We still have much to learn about aquatic systems. We've got to finish our survey of western Washington wetlands, continue to refine our aquatic classification system, and then turn our attention to eastern Washington, where more systematic work is needed.

Washington contains significant federal holdings—primarily U.S. Forest Service and National Park Service lands. In the past, we've concentrated our inventory efforts outside these areas. But as we complete our work on private and state lands, inventorying federal properties probably will take up a greater percentage of our time in the field. We can also provide valuable assistance to the U.S. Fish and Wildlife Service in developing recovery plans for Washington plants when they are federally listed as endangered or threatened.

Finally, we're just beginning to experiment with active management on our preserves—using such methods as controlled burning or manual removal of exotic species. Management alone could provide us with ample challenges for years to come.

Although we're proud of our natural heritage program, we are still a long way from being on "automatic pilot." But the computer will *never* replace the need for a well-trained staff to handle ever-changing data.

A Federal Perspective

by Senator John H. Chafee

OVER THE LAST two decades, the Congress of the United States has been establishing, by bits and pieces, a national policy for the preservation of biological diversity. Landmark legislation—the National Environmental Policy Act of 1969—laid the groundwork for this effort when it declared it to be federal policy to preserve our "natural heritage" and to "maintain, wherever possible, an environment which supports diversity. . . ."

Also, a growing body of other federal legislation gradually has reflected Congressional intent. The Endangered Species Act of 1973 has been the most important single law enacted to secure the protection of biological diversity by its explicit requirement that plant and animal life facing extinction receive federal protection. The law required all federal agencies to avoid acts harmful to endangered species and provided funding for federal and state activities to support an aggressive program of protection.

The National Forest Management Act of 1976 requires the U.S. Forest Service to develop plans that provide for the maintenance of diversity of plant and animal communities in national forests. Many other laws—such as the Sikes Act of 1974, the Fish and Wildlife Coordination Act of 1958, the Public Rangeland Improvement Act of 1978, and the Fish and Wildlife Conservation Act of 1980—express concern for biological diversity conservation, though in the less specific terms of preserving wildlife, habitat, or particular ecosystems.

Congress recently reaffirmed its concern about the environment and the need to preserve biological diversity throughout the world, through the International Environmental Protection Act of 1983. This legislation amended the Foreign Assistance Act to require the Agency for International Development to create a strategy that will "protect and conserve biological diversity in developing countries."

WHILE THE CONCERN for maintaining biological diversity has been growing slowly in the public sector, one private institution, The Nature Conservancy, has been concentrating on the problem all along and developing a coherent way of dealing with it. The Conservancy was the first organization, public or private, to promote this conservation issue. The Conservancy's sole purpose of "preserving natural diversity by protecting lands and waters supporting the best examples of all elements of our natural world" dates back to the group's beginnings in the Ecological Society of America in 1917. To achieve this goal, the Conservancy has cooperated over the years with various federal agencies in all three main facets of its mission: collecting and analyzing information on natural habitats, acquiring and protecting the most threatened lands, and managing in perpetuity the biological reserves it establishes.

Our country's diversity of biological resources is ever more in jeopardy. To preserve it, our greatest initial need is accurate and comprehensive knowledge of the status, distribution, and ecological requirements of our biota. Most of the federal natural resource agencies have been mandated by Congress to gather and organize natural resource information, including biological data.

However, the information collected by nearly all of these agencies emphasizes federally held lands or only certain categories of species or communities, or both. If they coordinated their activities, gaps in information—and even duplication—would be minimized. Even then, some blank spots would remain. One of the best ways for federal agencies to obtain really comprehensive data is by working closely with the individual states, most of which now have the means of providing the requisite biological information through their own natural heritage programs.

Described in detail in this *News* issue, state natural heritage programs are innovative biological inventory and data-management efforts that have been developed through a unique partnership between the states and The Nature Conservancy. In most cases, the Conservancy actually has been contracted by state governments to create, train, and initially supervise a staff of biologists and information management specialists who establish a program that eventually will continue as a unit of state government.

C.C. Lockwood

Above: knee-deep in Kisatchie National Forest's Loving Creek, Louisiana Heritage Program scientists survey an endemic mussel. The U.S. Forest Service enlisted their aid in conserving three streams that constitute the species' world range. At right: Knowlton's cactus—all but annihilated by collectors and damaging land-use practices—is being reintroduced in the wild through the joint efforts of two federal agencies, the Conservancy, and the New Mexico Heritage Program. (The plant's only known site was donated to the Conservancy in 1983.)

B.C. Johnston

There are now 38 of these programs, and several others—referred to as conservation data centers—are being started by Latin American countries along the same lines. My own state of Rhode Island joined the ranks of "heritage states" early—in 1978. It accepted full management of the program from the Conservancy in 1980 and has been carrying on the inventory ever since.

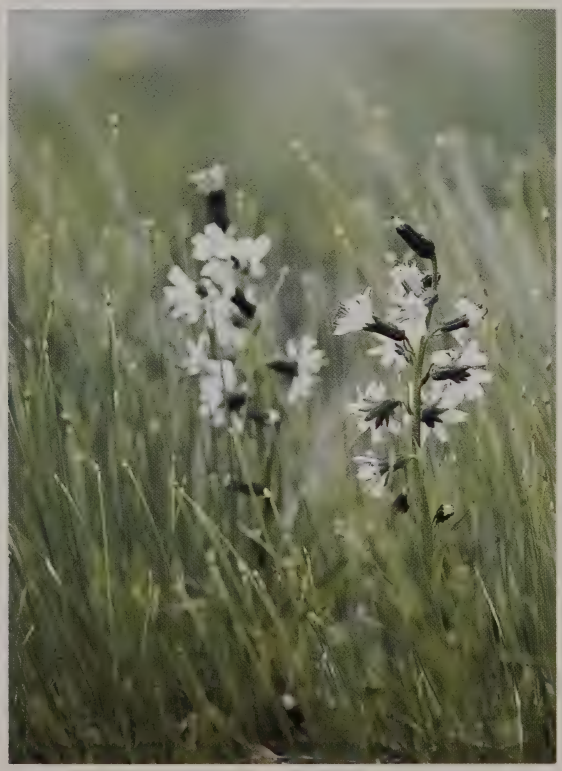
This idea of a continuous inventory is a defining characteristic of state heritage programs. By constantly updating their data, the programs always present a fresh picture of biological conservation priorities to decision makers. With a collective, almost nationwide network of professional staff members now numbering in the hundreds, the heritage programs rapidly are becoming the foremost storehouse of information on our nation's biological and ecological resources. Data from the programs are provided to all legitimate users: corporations, environmental and other organizations, individuals, and government agencies.

IN MY OPINION, the inventories' growing potential to be of assistance to various federal agencies in accomplishing their biological diversity conservation goals cannot be overstated. Many agencies already have cooperated with state heritage programs. Until a few years ago, they played a critical role in financially supporting the inventories through a variety of grant-in-aid programs, such as the Land and Water Conservation Fund and state cooperative agreements prescribed in "section six" of the Endangered Species Act. Although these funding sources have been considerably reduced, leaving the burden of continuing the programs almost totally on the states and the private sector, many federal agencies have become regular users of heritage information.

In a few instances, various agencies have contracted with heritage programs to "manage" information for them—that is, to provide, retain, and resupply data on habitats and rare species on those agencies' lands. And in some states, the heritage programs are becoming something of a "community project," with more than one agency contributing staff or funding, participating on interagency protection planning committees, serving in advisory roles, or establishing common data standards.

As time goes on, it seems inevitable that federal agencies will increase their use of state heritage programs. For instance, the inventories certainly can help accelerate the process of determining the exact status of rare species and their critical habitat needs. Wetlands found by the programs to have high biological significance might merit careful evaluation under "section 404" of the Clean Water Act, which calls for the identification of our most important aquatic systems.

Heritage information should prove invaluable in selecting lands for federal acquisition or designation. It also should become standard practice for agencies to consult heritage data when assessing the environmental impact of development projects or when reviewing permit applications that will affect biological resources. Moreover, all relevant agencies should be willing to make appropriate contributions to ensure the health and further refinement of the network of state heritage programs.



Larry Master

Boott's rattlesnake root, a candidate for the endangered species list, was one of 32 Northeastern species surveyed by heritage botanists for the U.S. Fish and Wildlife Service. The Conservancy's Eastern Heritage Task Force orchestrated the study.

I HOPE AND EXPECT that these forms of cooperation will continue and expand. There may be ways in which Congress might help this process along, possibly by clarifying amendments to existing legislation, or by taking an entirely new approach yet to be developed.

But one thing is clear: our heritage of biological diversity is imperiled, not only domestically but also throughout the world. Concern has been steadily rising in many quarters, and the natural heritage inventory programs are an important part of what is needed to address the problem. The Nature Conservancy has seen a need and acted to fill it—with remarkable success.

ECOLOGY FORUM

No. 57
by Robert E. Jenkins
Vice President for Science Programs

INFORMATION METHODS: WHY THE HERITAGE PROGRAMS WORK

The Nature Conservancy has its origins in the scientific community. From its beginnings, the organization has been involved in biological and ecological surveys (which were referred to generally as "natural areas inventories"), having conducted or participated in almost every one—from the local to the national. Most of the early efforts were of limited value—partly because they were underpowered for the task and partly because no one had yet found a workable approach, conceptual or methodological, to cataloging the complexities of natural systems.

Since 1974, our performance in this field has improved tremendously thanks to the establishment and continuous growth of the state natural heritage programs. These inventories now nearly blanket the U.S. and, through the efforts of our International Program, extend into a number of Latin American countries as "conservation data centers." Whatever the name, each of these programs is, as we have so often put it: "a permanent and dynamic atlas and data bank on the existence, characteristics, numbers, condition, status, location, and distribution of occurrences of the elements of natural biological and ecological diversity." (As ponderous as it sounds, this is a simple and accurate definition of the concept!)

Natural heritage programs and conservation data centers have eclipsed predecessor inventories through their mastery of biological data and their capacity to use those data in a wide array of applications: in research, in setting conservation priorities, in natural resource management, and in development planning. There are manifold reasons for this success. Among the most significant are the following:

Focused goal: Many earlier inventories suffered from objectives that were unclear or overly general. By seeking to gather data on a number of distinctly different subjects—scenery, recreational values, and natural resources in addition to biological characteristics—they muddled their results. Recognition that the Conservancy's main business is *to conserve biological (and ecological) diversity,* and that this is also the correct object of the inventories, brought clarity to the identification task. Most meaningfully, it simplified the classification, inventory, and analysis of a vast body of potentially important data.

Focused method: The focused goal allowed us to make a breakthrough in methodology. The Conservancy reversed the virtually universal procedure of inventorying selected sites for their natural values. In place of "sites" as the functional unit, the heritage programs substituted "elements" of biological and ecological diversity: the individual plants, animals, and complexes thereof (primarily terrestrial and aquatic community or ecosystem types) that we are seeking to protect. By listing, classifying, and characterizing the *elements* rather than the natural areas where they occur, the inventories can determine relative endangerment, track down the finest occurrence on the landscape, and identify conservation priorities in the state. The system makes it possible for heritage scientists to compile a list of places that support "the last of the least, and the best of the rest"—those elements that are rare, endangered, or otherwise sensitive to destruction.

Multi-institutional cooperation: The heritage inventories are carried out primarily by state agencies. The Conservancy supplies the methodology, trains and initially supervises the program's staff, offers technical support, and coordinates data exchanges and other forms of multi-state collaboration over the longer run. This cooperation for the common benefit has been crucial: the job was too big for the Conservancy to do alone, but its methods and resources have helped the states organize workable programs without reinventing the wheel. In some states, the scope of cooperation is even broader, with staff or funding furnished by several agencies or organizations. In terms of data gathering and data use, the

network of institutional cooperators becomes very broad indeed—involving universities, corporations, federal agencies, and other conservation groups (to name only a few).

Program continuity: Cooperation with the states is critical to supporting a permanent inventory program that can add to and refine its data base. Because the heritage programs are designed to continue indefinitely, their value increases with each year of operation. The information is increasingly accurate, complete, and useful. This is a remarkable advance over most past inventories, which were short-term projects chartered to produce their reports and then go away. The information aged rapidly as conditions changed on the land, but there was no method for amending or enlarging the inventory. Worst of all, once the staff decamped, much of the data became useless because no one else could interpret the terminology and data conventions. Also, there was no record of what worked and what didn't—so there was no overall progress in inventory technology.

Practical geographic scale: Serendipitously, cooperating with state governments has had the effect of solving another major problem: finding a workable geographic scale for such inventories. Some of the least successful early surveys tried to encompass the entire continent, a task beyond everybody's ability. In terms of data volume alone—not to mention the diversity of "elements" and the difficulties of contacting a horde of individual experts—such a scale was unfeasible. Other inventories were very localized, concentrating on a single large site or preserve. Too small to justify a truly rigorous effort, they typically yielded results that were idiosyncratic and couldn't be integrated into the big picture. Dealing with something the size of an average state has turned out to be just about right.

Successive approximation: The heritage programs are constantly evolving, and with that evolution comes modification and realignment. "Successive approximation" is the continual refinement of our methods—and of our actual information collection and management. The same general idea is sometimes expressed in terms of "incrementalism," "hierarchical prioritization," "skewed information systems," or "iterative feedback." This may completely cloud the issue for some, but others will recognize the concept by its alternate names. On the level of methods development, our techniques change as we design, agonize over, and apply particular techniques—then alter them as experience dictates. Each new methodological approximation is thus a systematic improvement over the last. In terms of data gathering and management, successive approximation operates through continual realignment of priorities. We regularly analyze each inventory's content, identifying gaps in our knowledge and determining their relative importance. This greatly enhances efficiency by retargeting limited resources.

Factual, balanced information system: In addition to those mentioned above, there are at least two system attributes that deserve attention. First is the development of a *balanced information system* in which the bulk of the data is consigned to carefully structured manual files and maps, and the computer is reserved primarily for terse records and automated sorting tasks. Such a system employs the computer to answer simple inquiries while using staff expertise and less structured manual data for complex applications. Second is the system's *strong factual basis:* we record facts, not an interpretation of those facts. Because the data are not distorted through the filter of any particular set of criteria as to significance, the information can be applied by the broadest possible range of users. By the same token, previously collected information does not lose its usefulness as our perceptions of significance change.

Standardization: Standardizing the inventories is absolutely necessary for orderly methodological refinement, free exchange of data, efficient research and development investment, and accommodation of heritage-data users. The challenge has been to develop systems that are sufficiently impressive to overcome the impulse for each program to invent for itself—and then prefer whatever it invented. Despite the obstacles, the heritage network demonstrates a high degree of standardization. Standards are maintainable in part because we take a hierarchical approach to them as well. Absolute uniformity is necessary in defining the most fundamental "units of record," but a modicum of inconsistency in less basic terms isn't fatal. Therefore, while we are careful to maintain standards most strictly where they really matter, we don't try everyone's patience by insisting on standards in peripheral parts of the data system. Other factors at work in maintaining standards include comprehensive training, tight early supervision, constantly refined operating manuals, frequent communication, camaraderie among the staffs, practical requirements for data exchange, dogged persistence, a system that actually works, and a certain amount of intransigence on the part of the national heritage task force.

Central support: It has been invaluable to have a central heritage task force to support the state programs. In addition to paying unflagging attention to all of the technical matters outlined above, this staff trains new staff, develops new procedures,

adopts improvements from the field, raises funds, maintains standard operating manuals, keeps an eye on each program, facilitates interaction with other branches of the Conservancy, and encourages additional states to join the network. Another service of increasing importance is the maintenance of commonly useful information (such as the range-wide status of a species found in several states or data on its ecological requirements) to avoid duplication of effort. In this and other duties, the national task force is currently aided by subordinate task forces in the Conservancy's regional offices. In the meantime, the central operation is rapidly becoming a national repository of biological information.

Stated simply, the object of our efforts has been mastery of the facts. We have learned how to organize information for use by the many institutions making decisions that affect the landscape and the biota within it. We are working now to enlarge the sphere of applications so that someday soon, no judgment that could benefit from the heritage resource will be made without it.

Ideally, more and more parties will join as users of, and contributors to, the heritage network—employing it as an aid to their activities and returning new data and other forms of support to ensure its advancement. Cooperation among institutions, a key to the success of the heritage inventories to date, will assume ever greater significance in the years to come. What we can't achieve individually, we will achieve together: the continuance and expansion of a system that makes knowledge work for the benefit of all.

BIRDING AT MONTANA'S PINE BUTTE SWAMP

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From time to time, The Nature Conservancy exchanges membership lists with other conservation organizations whose work might also interest you. In this way, we are able to increase the Conservancy's membership at a lower cost than would otherwise be possible. However, if you prefer *not* to receive these mailings from other organizations, please attach the mailing label from this magazine (or copy the label *exactly*) and mail it to:

Membership Secretary
The Nature Conservancy
1800 North Kent Street
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NEW PROJECTS

CALIFORNIA

Baldwin Lake—Addition—(San Bernardino County). A 408-acre purchase extends protection for the world's largest undisturbed stretch of "pebble plain." Here at the north end of Big Bear Valley's Baldwin Lake, the earth is a mix of alkaline clay and cobbles of sarragossa quartz found only in this part of the San Bernardino Mountains. It fosters the growth of 14 plant species listed as rare and endangered by the California Native Plant Society. Eleven are endemic to the area, including slender-petaled mustard and Big Bear checkerbloom, both of which are federally listed as endangered. The lake itself hosts a sizable wintering population of waterfowl as well as nationally endangered bald eagles.The 532-acre preserve is managed by the California Field Office.

Kern River Preserve—Addition—(Kern County). Encompassing a lush cottonwood/willow riparian forest—an ecosystem virtually obliterated in California—this sanctuary draws more than 150 bird species. Three are known to breed on the property: yellow-billed cuckoos and Bell's vireos (both endangered in the state), and great blue herons. Through a recent land exchange, the Conservancy acquired an additional 221 acres at Kern River. Managed by a professional Conservancy land steward, the preserve now totals 1,127 acres.

CONNECTICUT

Great Island Marsh Preserve—Additions—(Town of Old Lyme). Donations from Adela S. Bartholomew and Philip P. Johnston—two undivided interests (totaling 61 percent) in 32 acres—further safeguard this sanctuary at the mouth of the Connecticut River. Great Island is a salt-water tidal marsh within a much larger system of estuaries, channels, and marshes the Conservancy is working to protect. It hosts a array of bird species not often seen in Connecticut, including king rail, willet, and American bittern. A project of the Connecticut Critical Areas Program, the 43-acre preserve is managed by the Connecticut Chapter. The State of Connecticut owns the remainder of the marsh.

Moore Brook Watershed—Additions—(Town of Salisbury). In its run from Fisher Pond to its union with Spruce Swamp, trout-rich Moore Brook traverses a series of wetland communities, including two of outstanding quality: a calcareous fen and a calcareous seepage swamp. Both give rise to at least 10 rare plant species. Among them are sweet coltsfoot (endangered in Connecticut) in the state's largest population, white adder's mouth orchid (also endangered) in one of only two stations in the state, and dwarf scouring rush (a boreal species threatened in Connecticut). Gifts of conservation easements from Mr. and Mrs Johann Brinckmann and Mr. and Mrs. George Rosenfeld on 28 acres bring the preserve's current acreage to 233. The six easements here are monitored by the Conservancy's Connecticut Chapter—which targeted the site for protection through its critical areas program—and The Salisbury Association.

FLORIDA

East Spruce Creek (Volusia County). A purchase of 610 acres preserves a site of high forested bluffs, xeric hammock, estuarine marsh, and a mile-and-a-half stretch of estuarine Spruce Creek. Acquired in cooperation with the State of Florida, Ponce de Leon Port Authority, Volusia County, City of Port Orange, City of New Smyrna, City of South Daytona, City of Daytona Beach Shores, and City of Daytona Beach, the land will be conveyed to the state for management as a new state park.

Tiger Creek—Additions—(Polk County). Thanks to a partial gift of 1,068 acres and a full gift of 231 acres from Alico, Inc., the Conservancy has extended protection at Tiger Creek—an unspoiled blackwater stream that passes through swampwoods and sandhills. Much of the preserve's upland acreage supports scrub, a vanishing natural community rich in such rare and endemic plants as pygmy fringe-tree, scrub plum, pigeon wing, and Florida bonamia. Several animals endangered, threatened, or rare either nationwide or in the state occur here: Florida scrub jay, Florida mouse, gopher tortoise, eastern indigo snake, Florida scrub lizard, and sand skink. The Alico additions embrace almost all the natural land remaining in this watershed. A target of the Conservancy's Katharine Ordway Endangered Species Conservation Program, the 4,227-acre preserve is managed by the American Foundation and the Florida Chapter.

ILLINOIS

Lower Cache River Preserve—Addition—(Pulaski County). A mazy expanse of swamps and sloughs with stands of huge bald cypress trees (many over

1,000 years old) and tupelos, this refuge embraces a six-mile stretch of the Lower Cache River. The sanctuary also claims a "national record tree"—the largest water locust in the U.S.—and 13 other trees that hold state records for their great size. And there's more: three plant species listed as endangered in Illinois. Eighty-five acres gained through a partial land exchange bring the preserve to 492 acres. Recommended for protection by the Illinois Natural Areas Inventory, holdings along the Lower Cache were acquired through the National Critical Areas Conservation Program and are managed by a Conservancy land steward.

INDIANA

Green's Bluff Preserve (Owen County). Steep cliffs rising above Raccoon Creek support a dense stand of native hemlock trees—a relict forest community that may date back some 10,000 years to the time of Indiana's last major glacial activity. Purchase of 100 acres protects the hemlocks and one of only two known Indiana populations of mountain spleenwort, which is endangered in the state. Four other jeopardized plants also occur at the site: hay-scented fern, golden seal, pinesap, and spotted wintergreen. Slated for dedication as a state nature preserve, the new Indiana Chapter sanctuary is a top priority of the Indiana Natural Heritage Protection Campaign—a joint Conservancy/state effort.

IOWA

Red Cedar Woodland (Muscatine County). Many Iowa rivers are no longer wild, and their bordering woodlands have been degraded or destroyed. But the Cedar River's floodplain still supports an extensive forest. Dominated by sycamore, river birch, and swamp white oak, this rare natural community is potential habitat for red-shouldered hawk (endangered in Iowa), Illinois mud turtle (also endangered and a candidate for federal protection), and Blanding's turtle (rare in the state). A generous gift of Mrs. Nellie Reis, the 34-acre property is managed by the Iowa Chapter.

MARYLAND

Charlestown Sites (Cecil County). The Conservancy has assisted the Town of Charlestown and the Maryland Environmental Trust in securing conservation easements on three parcels totaling five acres. Encompassing a stretch of fresh intertidal beach and an intermittent fringe marsh, the tracts provide habitat for two endemic plant species: awl-shaped mudwort (endangered in the state) and globally threatened Maryland bur-marigold. Covering lands previously protected by the landowners via the Conservancy's Maryland Registry Program, the three easements will be monitored by the Maryland Environmental Trust.

MONTANA

B-Bar Ranch (Park County). Donated by Maryanne Mott, a conservation easement on two tracts totaling 115 acres protects land lying within essential grizzly bear habitat. The property, which lies in the Tom Miner Basin on the northern rim of the Yellowstone National Park, will be monitored by the Conservancy's Big Sky (Montana/Wyoming) Field Office.

Pine Butte Swamp Preserve—Addition—(Teton County). Each spring the grizzlies descend from their mountain retreats and follow the water courses down to Pine Butte's swamps, there to feed and raise their young. The nationally threatened bears join a plethora of other species that make this preserve a wildlife bonanza: golden eagle, sandhill crane, lynx, bobcat, cougar, gray wolf, moose, mountain goat, bighorn sheep, elk . . . . The donation of a conservation easement on 46 acres from Dr. George and Janet Schemm brings Conservancy holdings here along the Teton River to 12,491 acres. The refuge, which takes in all of 500-foot-high Pine Butte and a diversity of natural communities, is managed by the Big Sky (Montana/Wyoming) Field Office. It is a project of the Conservancy's National Critical Areas Conservation Program.

NEW YORK

Accabonac Harbor—Addition—(Suffolk County). With this seven-acre gift from the estate of Samuel A. Duncan, Conservancy protection here spans 152 acres. A tidal marsh preserve adjoining a 1,000-acre estuary, the site supports 158 bird species, including nesting populations of piping plovers (proposed for federal listing as nationally threatened) and rare least terns. Its waters provide overwintering ground for harbor seals and a nursery for nearly 100 aquatic invertebrate species. Accabonac Harbor is managed by the Conservancy's South Fork/Shelter Island Chapter.

OHIO

Cedar Falls/Marian Becker Preserve—Addition—(Adams County). The recent purchase of 187 acres brings the Conservancy's total at Cedar Falls to 217 acres. The area's pristine stream flows through a rugged dolomite gorge, and its arborvitae/mixed wood forest is the best occurrence of this rare natural community in Ohio. It also harbors seven imperiled plant species, including wall rue and grape honeysuckle (both threatened in the state) and little

Fred Annand

Roanoke River Project

Here in the "back swamp," the Roanoke River's brown waters slip past huge cypresses and fat-bottomed tupelo gums. Interspersed with knotty cypress knees, some of them head high, the trees form a canopy as much as 100 feet overhead. Come spring, the tallest of the cypresses support clamorous rookeries of nesting great egrets and great blue herons. Upstream—and away from the deep swamp— cottonwoods, elms, hickories, and oaks overhang the riverbanks. Particularly abundant on the natural levees and fluvial ridges created by the river, the oaks make for ideal wild turkey habitat (the lure is acorns).

Since 1980, this floodplain in northeastern North Carolina has been a priority of the Conservancy's field office in Chapel Hill. Recent purchase of 5,360 acres in several tracts (a bargain sale by True Temper, Inc.—a subsidiary of Allegheny International Corporation), brings our protection total to 10,417 acres and more than 20 miles of the river course.

There are bobcats, river otters, minks, beavers, and gray foxes in the wilderness. And at the mouth of the Roanoke, Great and Goodman Islands (which the Conservancy acquired in 1983) offer refuge for the beleaguered coastal plain black bear. Wintering ducks defy counting; breeding birds are abundant (Kentucky and Swainson's warblers among them); and the swamp supports both Mississippi kites, endangered in North Carolina, and cerulean warblers, threatened in the state. The new properties also host the state's only coastal plain population of Virginia bluebells.

Protected in concert with the State of North Carolina under the Richard King Mellon National Wetlands Conservation Project, the Roanoke River floodplain bears one of the finest hardwood bottomlands in the Southeast. The Conservancy has conveyed its holdings here (with the exception of Camassia Slopes, a 176-acre gift from the Union Camp Corporation in 1982) to the state for management by the North Carolina Wildlife Resources Commission.

grey polypody (endangered in Ohio). The sanctuary is managed by the Conservancy's Ohio Chapter.

Hanging Prairie—Addition—(Adams County). This tract is a key link in protecting the sprawling and diverse nine-mile-long Edge of Appalachia Preserve System, an assemblage of eight contiguous sanctuaries. Lying next to Red Rock Preserve, Hanging Prairie and its newly purchased 158-acre addition support at least 19 rare plant species—including Bicknell's panic grass, listed as endangered in Ohio. Embracing some 6,000 acres of woodlands and prairie openings riddled with steep gorges and artesian springs, the preserve system is owned and managed in part by the Conservancy, in part by the Cincinnati Museum of Natural History.

Pickerington Pond—Addition—(Franklin County). The character of this rolling terrain, whose ponds and marshes swell and recede with fluctuating water levels, closely resembles that of prairie pothole country farther west. A haven for waterfowl, the preserve features a permanent stream and critical wetland habitat. Through a 46-acre purchase, the Conservancy has gained one of the last parcels lying within the actual wetland. It will be conveyed to the Columbus and Franklin County Metropolitan Park District, which manages the existing preserve. Conservancy-protected acreage here how stands at 403.

TENNESSEE

Lower Hatchie National Wildlife Refuge—Addition—(Lauderdale County). Purchased for inclusion in the wildlife refuge, this 127-acre inholding bears Mississippi River floodplain forest. Its sandy Hatchie River peninsula is habitat for Mississippi kite (threatened in Tennessee), overwintering waterfowl, and abundant wild turkeys. The site will be conveyed to the U.S. Fish and Wildlife Service for management. (Monies for the transfer will be provided by the Migratory Bird Commission Fund.) Conservancy-secured lands here total 772 acres.

WASHINGTON

Bald Hill Preserve (Thurston County). Acquired from the Weyerhaeuser Company through a complex three-party land exchange, this 184-acre property fosters the growth of more than 200 native plant species. One of these, the giant trillium, is ranked as threatened in the state; another, the California sword-fern, is listed as rare. The site also supports a remnant old-growth Douglas fir forest interspersed with oak savanna balds. (Found on sunny, south-facing slopes, the balds are dominated by grasses and forbs.) The land will be conveyed to the Washington Department of Natural Resources for dedication as a state natural area preserve. The Washington Natural Heritage Program will manage it.

Carlisle Bog—Addition—(Grays Harbor County). With its sedges and sphagnum moss, this series of open ponds linked by narrow channels may look like an ordinary bog. It's not: it bears two rare plant species—swamp sandwort (a candidate for federal protection) and Menzie's burnet—as well as a fish endemic to the Olympic Peninsula. With the recent purchase of 50 acres, the preserve takes in 310 acres. Both the addition and the original sanctuary are managed by the Washington Natural Heritage Program of the Washington Department of Natural Resources.

WISCONSIN

Baraboo Hills Project/Baxter's Hollow: R.D. and Linda Peters Nature Preserve—Additions—(Sauk County). Otter Creek in the Baraboo Hills is a cold-water trout stream used extensively for aquatic invertebrate research. The purchase of 20 acres enhances protection for Otter Creek's watershed—the only undeveloped one in southern Wisconsin—and for a set of essential springs. Now totaling 2,227 acres, the sanctuary is managed by the Conservancy's Wisconsin Chapter.

Rowan Creek Preserve (Columbia County). At the request of the Wisconsin Department of Natural Resources, the Conservancy has purchased a 128-acre tract that boasts more than half a mile of Rowan Creek—a fast, cold spring-fed stream that weaves its way through a marsh of emergent aquatic plants characterized by cattails and bulrushes. The land will be conveyed to and managed by the department.

MONTANA WILDERNESS HORSEPACK TRIPS

Adjacent to the Conservancy's Pine Butte Swamp Preserve in Montana is a wilderness area encompassing over 1 million acres—the Bob Marshall. Known for its pristine lakes and streams, mountain vistas, and abundant wildlife, the "Bob" offers visitors a rare glimpse into America's Rocky Mountain wilds. The Montana/Wyoming Field Office invites you to join us for ten-day horsepack trips into this rugged ecosystem during the summer of 1986. The cost is $1,850 per person (partially tax deductible). For details, contact: Benjamin Pierce, Montana Field Office, P.O. Box 258, Helena, MT 59624/(406) 443-0303.

Nancy Adams

TIRED OF OWNING LAND IN THE SAME OLD "TOWN"?

Find out how your gift of appreciated real estate can help the Conservancy provide shelter for wildlife . . . and for your income. We can put your surplus property (residential, industrial, or commercial) to work for conservation, while bringing you such advantages as:

- federal and state tax savings
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For more information, write: Barbara Kerley, Trade Lands, The Nature Conservancy, 1800 N. Kent Street, Arlington, Virginia 22209; or call (703) 841-5327.

FIELD COURSES OFFERED AT SYCAN MARSH

Along the interface of Oregon's Cascade Range and the Great Basin lies the Conservancy's 25,000-acre Katharine Ordway Sycan Marsh Preserve. After a very successful first year, we will again offer natural history field courses on the preserve from May-July 1986. Each course embraces botany, general natural history, ornithology, geology, and land-use patterns of the region. Excursions will take in vast alkaline Summer and Warner Lakes, the spectacular fault-block mountains Hart and Winter Rim, sage and greasewood deserts, forests of pine and fir, and freshwater wetlands hosting some 200 breeding greater sandhill cranes along with bitterns, pelicans, waterfowl, curlews, and phalaropes.

Transportation, meals, and tents for staff and nine participants per session will be provided. The rustic cabin for meals and evening relaxation makes a perfect setting in the meadow campsite. The cost is $850 per ten-day session. For further information, contact: Sycan Natural History Program, The Nature Conservancy, 1234 N.W. 25th Avenue, Portland, OR 97210. Phone: (503) 228-9561.

MONTANA FLY-FISHING FLOAT TRIPS

The Yellowstone, Smith, North Fork of the Flathead, Madison, Big Hole, and Big Horn Rivers offer some of the finest fishing and scenery left in the lower 48 states. Trips for members and friends are available on these and other rivers between June 1 and September 30 through the Montana/Wyoming Field Office. Cost is $225 per day (partially tax-deductible) with trips running from three to seven days. Birders and photographers are welcome. Food is gourmet; weather is unpredictable! For details, write to: Benjamin Pierce, Montana/Wyoming Field Office, P.O. Box 258, Helena, MT 59624; or call (406) 443-0303.

BUY A TOY TO SAVE A SPECIES

Delight a child with a beautiful stuffed animal—and help the Conservancy save the real thing!

"Special Friends" have been designed to represent endangered animals from each continent. Available this year are Dexter the Black-Footed Ferret (from North America) and Julio the Spectacled Bear (from South America).

The toy will arrive in a habitat display box—a durable replica of the animal's home terrain—with a certificate that recognizes the purchaser for his or her contribution and describes the species, its plight, and efforts to protect it.

Send your check ($30 for the ferret or $35 for the bear, plus $3.25 for shipping) to:

Special Friends
Dexter-Portfolio Company, Inc.
P.O. Box 10
Joseph, Oregon 97846

If you wish to charge your purchase to a Visa or MasterCard account, call (503) 432-5805.

Remember, a portion of your check will go to the Conservancy—so the gift works two ways.

Oak Leaf Awards 1984

Once a year The Nature Conservancy acknowledges the outstanding efforts of its members through the presentation of Oak Leaf Awards. The award, symbolized by a green and gold lapel pin, is given in recognition of especially dedicated service and support toward achieving the Conservancy's objectives. This year's awards were presented at the annual meeting awards banquet on October 5 in Orlando, Florida.

John E. Andrus III, as chairman of the national Board of Governors during the late 70s, guided the Conservancy with wisdom and great effectiveness through a period of rapid growth and accomplishment. The Land Preservation Fund—our first major capital campaign—met its ambitious goals ahead of schedule. Mr. Andrus also served with distinction as the board's development committee chairman, and more recently he headed a successful wetlands campaign subcommittee of the board. As a Minnesota trustee, he has been a key participant in the chapter's successful $1.7 million critical area campaign.

James K. Bissell has been an articulate spokesman for conservation and the Conservancy in Ohio. He played an important role in preserving Arcola Creek (the state's finest estuary), in enlarging the Chagrin River Preserve, and in initiating the major Cuyahoga Wetland project. His botanical work and advice have been indispensable to stewardship planning at Arcola and to preserve design on the wetlands project.

George R. Cooley has been a hard-working and effective member of the Conservancy family for two-and-a-half decades. He was elected vice-chairman of the national Board of Governors six times, serving a total of more than 12 years on the board. As vice-president for finance, he guided the Conservancy on the road to solvency and fiscal respsonsibility, including establishment of a source of reliable bank financing for Conservancy projects—an action that enabled the Conservancy to protect hundreds of thousands of acres of natural land. He has been actively involved in the creation of Florida's Theodore Roosevelt Preserve, Cummer Sanctuary (catalyst for establishment of the Lower Suwannee River National Wildlife Refuge), and Tiger Creek.

Lawrence J. Eilers played a pivotal role in strengthening the Conservancy program in Iowa. As chapter chairman, he led efforts to add professional staff and to acquire threatened habitat. Later, as chairman of the chapter's identification committee, he supervised the creation of a list of 75 key sites to be included in the Iowa Critical Areas Campaign. He also worked to establish the Iowa Natural Areas Inventory Program.

Alexander S. Gardner, as chairman of the Conservancy's Connecticut Chapter, launched and directed a $3.1 million critical areas campaign that was the most ambitious and successful conservation effort—public or private—ever undertaken in the state. Under his leadership, the chapter organized one of the nation's most successful corporate associates programs and achieved a long-term goal by initiating a joint natural heritage program with the state—the Connecticut Natural Diversity Data Base.

Dr. John Alfred Gustafson's organizational skills were vital to the creation of the Conservancy's New York State Board of Directors, which he now chairs. He was one of the original trustees of the Central New York Chapter and later its chairman and treasurer. Dr. Gustafson also led efforts to create the Lime Hollow Preserve in New York and negotiated a complex stewardship arrangement for the sanctuary with local officials.

Elizabeth D. Kuhl, a founding trustee of the Maryland Chapter, headed chapter committees for all publications—from news releases to newsletters—for field trips, for trustee and annual meetings, and for fundraising exhibits. Her skill and efforts in publicizing Conservancy activities and goals to fellow Marylanders were critical to the success of the chapter's $1 million-plus natural areas campaign.

Mrs. John S. McCormick, Jr., was an early member and trustee of the Vermont Chapter and recently served as the chapter's chairman and treasurer. Her initial involvement and continued effort were essential to survival of the Vermont Chapter. One of Vermont's best known and most widely admired conservationists, she played a key role in the growth of the fledgling chapter from 17 members to the strong, successful organization it is today.

As a senior vice president of Arkansas Power and Light Company, **Charles S. Steel** was instrumental in securing a donation from his company of a bald eagle wintering site, valued at $1.3 million, to the Conservancy. Mr. Steel is chairman of the board of the Arkansas Chapter and has played a pivotal role in the Conservancy's emergence as an effective conservation force in the state. Under his leadership, the chapter completed eight significant protection projects during the past year as well as a $3.7 million wetland acquisition for Arkansas.

Clarence Streetman has been a member of the Tennessee Chapter board for six years. During that time he has served as chairman of the public relations committee, successfully bringing news of the Conservancy to the people of Tennessee. He helped Bowater Southern Paper Company develop its innovative "pocket wilderness" program and has been instrumental in Bowater's support for private conservation and the Conservancy, including the recent gift of 1,100 acres on Aetna Mountain in the Tennessee River Gorge.

Jerry W. Wright is a founder and co-chairman of the Friends of the Currituck Banks. Through the Friends of Currituck and through his own action, he successfully marshalled support from all quarters of the state for the creation of the Currituck National Wildlife Refuge and Estuarine Sanctuary. Subsequently, as chairman of the North Carolina Wildlife Resources Commission, he was instrumental in securing $2.7 million in support for the Roanoke River, a project of the Conservancy's National Wetlands Conservation Program.

Stewardship Awards

Each year the Conservancy honors a committee and individuals who have contributed significantly to the advancement of the science of stewardship on Conservancy preserves.

John Bacone, as a Conservancy member and volunteer, was responsible for the stewardship of a number of preserves in Indiana. He has developed management plans for them, conducted inventories, and supervised the work needed to put the plans into action. As director of nature preserves for the state of Indiana, he worked to strengthen the cooperative efforts of the state government and the Conservancy. He played a central role in the development of the $10 million Indiana Natural Heritage Campaign and in launching the campaign's stewardship trust fund.

The Board of Directors of the Friends of Nags Head Woods developed a visitor's center, built interpretive trails, and published visitor guides to aid in creating increased support and community understanding. A full ecological inventory and a comprehensive plan outlining long-range management goals for the preserve were both recently completed. The site stewardship summary for Nags Head Woods—an Atlantic maritime forest—is updated yearly to keep annual operating plans current.

President's Public Service Award

Over the years, many people outside the Conservancy's immediate family of volunteers and staff have become valued friends and have helped the Conservancy greatly in achieving its ambitious objectives. To recognize some of the most outstanding of these outstanding people, the President's Public Service Award has been created.

Governor Bob Graham has been the essential force in the development and success of conservation programs in Florida. Under his leadership, the state enacted the "Save Our Rivers" program, an innovative effort that addresses one of the most important ecological concerns of the coming decade: the preservation of water resources and wetland habitat. The program already has resulted in the protection of thousands of acres of Florida wetlands anhas set a fine example for other states to follow.

NEW LIFE MEMBERS

An individual becomes a Life Member of The Nature Conservancy upon contribution of $1,000 for membership dues or for the Land Preservation Fund, Guarantee & Income Fund, or a State Land Preservation Fund. Husbands and wives may hold a joint life membership for a single qualifying contribution.

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A corporation becomes a Corporate Associate of The Nature Conservancy upon contributing between $1,000 and $10,000 annually to the operations of the organization.

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Eastern Regional Office
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Boston, Massachusetts 02108
(617) 542-1908
Dennis Wolkoff, Vice President

Midwest Regional Office
1313 Fifth Street, S.E.
Minneapolis, Minnesota 55414
(612) 379-2207
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P.O. Box 270
Chapel Hill, North Carolina 27514
(919) 967-5493
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Western Regional Office
785 Market Street
San Francisco, California 94103
(415) 777-0541
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International Office
1785 Massachusetts Ave., N.W.
Washington, D.C. 20036
(202) 483-0231
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Arizona Field Office
30 N. Tucson Blvd.
Tucson, Arizona 85716
(602) 327-4478
Dan Campbell, Director

Arkansas Field Office
300 Spring Building
Little Rock, Arkansas 72201
(501) 372-2750
Kay Arnold, Director

California Field Office
785 Market Street
San Francisco, California 94103
(415) 777-0487
Peter Seligmann, Director

Colorado Field Office
1244 Pine Street
Boulder, Colorado 80302
(303) 444-2950
Sydney Macy, Director

Connecticut Chapter
55 High Street
Box MMM, Wesleyan Station
Middletown, Connecticut 06457
(203) 344-0716
W. Kent Olson, Director

Florida Field Office
1331 Palmetto Avenue, Suite 205
Winter Park, Florida 32789
(305) 628-5887
Michael L. Green, Director

Hawaii Project Office
1116 Smith Street, Suite 201
Honolulu, Hawaii 96817
(808) 537-4508
Kelvin Taketa, Director

Idaho Field Office
P.O. Box 2960
Hailey, Idaho 83333
(208) 788-4683
Guy Bonnivier, Representative

Illinois Field Office
79 West Monroe Street
Suite 708
Chicago, Illinois 60603
(312) 346-8166
John Alexander, Director

Indiana Field Office
4200 N. Michigan Road
Indianapolis, Indiana 46208
(317) 923-7547
W. William Weeks, Director

Iowa Field Office
424 10th Street, Suite 311
Des Moines, Iowa 50309
(515) 244-5044
Lester L. Zimmer, Director

Kentucky Chapter
P.O. Box 2125
Covington, Kentucky 41012
(606) 291-8585
Hugh Archer, Director

Maine Chapter
122 Main Street
Topsham, Maine 04086
(207) 729-5181
Kent W. Wommack, Acting Director

Maryland/Delaware Field Office
Chevy Chase Center Office Bldg.
35 Wisconsin Circle, Suite 304
Chevy Chase, Maryland 20815
(301) 656-8673
Steven Hamblin, Director

Massachusetts/Rhode Island Field Office
294 Washington Street, Room 740
Boston, Massachusetts 02108
(617) 423-2545
Eve Endicott, Director

Michigan Field Office
Suite E, 531 N. Clippert Street
Lansing, Michigan 48912
(517) 332-1741
Tom Woiwode, Director

Minnesota Field Office
1313 Fifth Street, S.E.
Minneapolis, Minnesota 55414
(612) 379-2134
Geoffrey S. Barnard, Director

Missouri Field Office
2800 S. Brentwood Blvd.
St. Louis, Missouri 63144
(314) 968-1105
Rod Miller, Director

Montana/Wyoming Office
West Power Block, 4th Floor
P.O. Box 258
Helena, Montana 59624
(406) 443-0303
Robert J. Kiesling, Director

New Hampshire Field Office
7 South State Street, Suite 1
Concord, New Hampshire 03301
(603) 224-5853
Phillip M. Hoose, Director

New Mexico Field Office
610 Gold Avenue, S.W.
P.O. Box 1846
Albuquerque, New Mexico 87103
(505) 242-2015
John Egbert, Director

New York Field Office
1736 Western Avenue
Albany, New York 12203
(518) 869-6959
Charles Bassett, Director

New York Chapters:

Adirondack Conservancy
P.O. Box 188
Elizabethtown, New York 12932
(518) 873-2610
Timothy Barnett, Director

Central New York Chapter
P.O. Box 175
Ithaca, New York 14850
Clifford Berg, Chairman

Eastern New York Chapter
1736 Western Avenue
Albany, New York 12203
(518) 869-0453
Anne Williams, Director

Long Island Chapter
P.O. Box 72
Cold Spring Harbor, New York 11724
(516) 367-3225
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RFD #2, Chestnut Ridge Road
Mt. Kisco, New York 10549
(914) 666-5365
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P.O. Box JJJJ
East Hampton, New York 11937
(516) 267-3748
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North Carolina Field Office
P.O. Box 805
Chapel Hill, North Carolina 27514
(919) 967-7007
William de Buys, Director

Ohio Field Office
1504 West 1st Avenue
Columbus, Ohio 43212
(614) 486-6789
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Oregon Field Office
1234 N.W. 25th
Portland, Oregon 97210
(503) 228-9561
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1218 Chestnut Street, Suite 807
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(215) 925-1065
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P.O. Box 5475
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202 Capitol Blvd. Building
P.O. Box 3017
Nashville, Tennessee 37219
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321 Alamo Plaza
Suite 240
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(512) 224-8774
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138 Main Street
Montpelier, Vermont 05602
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619-B E. High Street
Charlottesville, Virginia, 22901
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1601 Second Ave., Suite 910
Seattle, Washington, 98101
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1100 Quarrier Street, Room 215
Charleston, West Virginia 25301
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Wisconsin Field Office
1045 E. Dayton Street, Room 209
Madison, Wisconsin 53703
(608) 251-8140
Brent Haglund, Director

THE NATURE CONSERVANCY

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